

Remarks

Claims 1-20 were pending in the subject application. By this Amendment, the applicants have amended claims 1, 4, 6, 7, 11-14, 16, 17, and 20, canceled claims 2, 3, and 15, and added new claims 21 and 22. No new matter has been introduced. Support for these amendments can be found throughout the original specification (see, for example, page 2, lines 1-7 and 13-30). Accordingly, claims 1-20 are now presented for examination.

The amendments have been made in an effort to lend greater clarity to the claimed subject matter and to expedite prosecution. This amendment should not be taken to indicate the applicants' agreement with, or acquiescence to, the rejections of record. Favorable consideration of the claims now presented, in view of the remarks and amendments set forth herein, is earnestly solicited.

The drawings have been objected to under 37 CFR §1.83(a) because they fail to show the titanium dioxide layer separate from the membrane as described at page 3, lines 15-16 of the specification. Initially, the applicants note that page 3, lines 15-16 of the specification does not necessarily require that the titanium dioxide layer is separate from the membrane. However, even assuming for the sake of argument that Example 1 does teach that the titanium dioxide layer is separate from the membrane, 37 CFR §1.83(a) requires that the drawings "must show every feature of the invention specified in the claims" (emphasis added; see also MPEP §608.02(d)). None of the claims specify that a titanium dioxide layer is present and separate from the membrane. Figure 1 shows the position in general terms; the titanium dioxide coating on the tin oxide layer can be so thin that it may distort the dimensions if it were represented by a separate layer. The applicants submit that the drawings show every feature of the claimed invention that is necessary for an understanding of the claimed invention.

The Action also states that it is unclear toward what parts of Figure 1 the arrows are pointing. The applicants respectfully disagree and assert that it is clear that, from left to right, the assembly of Figure 1 comprises: glass, SnO, TiO<sub>2</sub>, a membrane, and carbon/Pt. Figure 1 also depicts, with three arrows, light coming from the left. Accordingly, the applicants respectfully request reconsideration and withdrawal of the objection to the drawings.

The disclosure has been objected to for informalities. The applicants thank the Examiner for carefully reviewing the specification. The applicants have amended the subject disclosure as

suggested by the Examiner.

Claims 1, 6, 7, 11, 12, 14, 17 and 20 have been objected to for informalities. The applicants thank the Examiner for carefully reviewing the claims. Claims 1, 6, 7, 11, 12, 14, 17, and 20 have been amended as suggested by the Examiner. Accordingly, the applicants respectfully request reconsideration and withdrawal of the objection to claims 1, 6, 7, 11, 12, 14, 17, and 20.

Claims 1-20 have been rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement. The applicants respectfully traverse this ground for rejection.

As the Examiner is aware, “the test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.” MPEP §2164.01; *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986), cert. denied, 480 U.S. 947 (1987); and *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1463, 221 USPQ 481, 489 (Fed. Cir. 1984). The applicants submit that a person of ordinary skill in the art could make and use the invention, without undue experimentation, based on the disclosure in the subject specification coupled with information known in the art. Attached hereto is the executed Declaration Under 37 C.F.R. §1.132 of Dr. Simon Bourne (hereinafter referred to as “the Bourne Declaration”).

As discussed in paragraph 2 of the Bourne Declaration, it is known in the art that all that is required for the construction of a simple photovoltaic cell is a semiconductor material that can form an electric field and electric contacts on front and back, and which can be exposed to light. As discussed in paragraph 3 of the Bourne Declaration, the requirements of a photovoltaic cell are described in the original specification. The specification describes a membrane-electrode assembly wherein the electrodes of the assembly provide the contacts and the membrane can be irradiated with light. It is therefore sufficient for a photovoltaic cell only that the membrane should act in the same way as a semiconductor material. Claim 1 recites a photovoltaic cell comprising a membrane electrode assembly capable of transmitting light. A person of ordinary skill in the art can readily make such a photovoltaic cell, after reading the subject specification, with or without the teaching of specific membrane materials given in the specification (see last sentence of paragraph 3 of the Bourne Declaration).

Thus, one reasonably skilled in the art could make and/or use the invention from the disclosures in the specification coupled with information known in the art without undue experimentation (see MPEP §2164.01). Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §112, first paragraph.

Claims 2, 5, 9, 10, 15, 18, and 19 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The applicants respectfully request reconsideration.

Though the applicants do not necessarily agree that the term “strongly ionic group” is indefinite, the claims have been amended to specify that the strongly ionic group is “a sulphonic acid group, an OH group, or a phosphoric or phosphonic acid group,” as discussed at page 2, lines 15-16 of the subject specification. In addition, claims 1 and 14 now each recite that the membrane electrode assembly comprises a membrane, providing antecedent basis for “the membrane” of claims 5, 9, 10, 18, and 19. Thus, the applicants submit that the claims particularly point out and distinctly claim the subject matter regarded as the invention. Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §112, second paragraph.

Claims 1-20 have been rejected under 35 U.S.C. §102(b) as being anticipated by Chiba *et al.* (U.S. Patent Application Publication No. 2002/0134426; hereinafter referred to as “Chiba”). The applicants respectfully request reconsideration.

Independent claims 1 and 14 have each been amended to recite that the membrane of the membrane electrode assembly is a material comprising a hydrophilic polymer comprising a strongly ionic group, wherein the strongly ionic group is a sulphonic acid group, an OH group, or a phosphoric or phosphonic acid group. These advantageous features of the present invention are discussed at, for example, page 2, lines 13-30 of the subject specification.

On the other hand, Chiba discloses neither a hydrophilic polymer nor any of the strongly ionic groups listed in the claims. The Action asserts at page 6 that Chiba teaches a hydrophilic polymer in paragraph [0067], but the applicants cannot find disclosure of any hydrophilic polymer in paragraph [0067] of Chiba or in the remainder of the document. Instead, paragraph [0067] of Chiba merely presents a list of polymers but does not teach that any are hydrophilic. There is certainly no disclosure in Chiba of a hydrophilic polymer comprising one of the strongly ionic groups of the claimed invention.

As the Examiner is aware, it is a basic premise of patent law that in order to anticipate, a single reference must disclose within the four corners of the document each and every element and limitation contained in the rejected claim. *Scripps Clinic & Research Foundation v. Genentech Inc.*, 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991). As discussed above, Chiba fails to disclose certain elements of the claimed invention. For example, there is no teaching in Chiba of a hydrophilic polymer comprising a strongly ionic group as claimed.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection under §102.

Moreover, though it is not necessary to overcome the rejection under §102, the applicants submit that a person of ordinary skill in the art would not have had a reason to modify Chiba to arrive at the claimed invention. The membrane of the present invention is hydrophilic and inherently able to absorb and transmit water throughout its molecular structure. Advantageously, water can be used to cool the cell, maintain hydration, and carry away excess energy as heat. The final water uptake can advantageously be controlled separately from the electrical properties.

A further advantage of the subject invention is that the membrane electrode assembly can be irradiated at an obtuse angle, rather than having to do so normal to the electrode. This can be done by using the membrane as a light guide. This configuration is recited in new claims 21 and 22, which recite that the membrane electrode assembly is configured to function as a light waveguide (see also page 2, lines 1-7, of the subject specification). Such a configuration is advantageous and important, especially in the context of a translucent membrane.

In view of the foregoing remarks and amendments to the claims, the applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

The applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



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Attachment: Declaration Under 37 C.F.R. §1.132 of Dr. Simon Bourne (2 pages)